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IDENTIFIERS *Fryklund (Verne C)

ABSTRACT

Trade and industrial educators were pioneers in the development and practice of occupational analysis as utilized in curriculum development and improvement. In the 1940s, Verne C. Fryklund refined the existing system of occupational analysis and introduced it into public school industrial arts educational programs. The basic concept of Fryklund's analysis system was to break down technical information and skills into elemental parts that, when learned well, could be combined into larger units of work called jobs. More recently, curriculum guides have become increasingly complex, to the point where they are more abstract and less practical in the classrooms. While nothing is wrong with the contemporary approach to job analysis, it has become so finely tuned that ordinary laboratory teachers with a minimal research and development background are often uncomfortable with it and avoid getting involved in occupational analysis themselves. This does not have to be the case since trade and industrial teachers have had a simple, yet truly superior, analysis system for over 40 years. Trade and industrial education teachers should not lose their heritage in occupational analysis but, rather, should use Fryklund's system of occupational analysis to have more influence on contemporary curriculum development. (Appended to this report is a guide for developing the Fryklund system of occupational analysis.) (MN)

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TRADITIONAL OCCUPATIONAL ANALYSIS AND CONTEMPORARY CBVE INSTRUCTION

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Trade and Industrial Education has a rich heritage in the development and practice of occupational analysis, as utilized in curriculum development and improvement. We were pioneers in this field and were practicing analysis in Trade and Industrial Education long before other vocational fields realized its importance.

Our heritage goes back to 1917 when Charles Allen introduced a job analysis system for training workers at the Newport News Drydocks and Shipbuilding Company. During World War I a serious shortage of skilled mechanics pointed out the need for development of a system of industrial teaching which would be time efficient and measurable. Through the use of Allen's scientific approach to job analysis, skilled workers could be trained in about 60 percent of the time than had been required formerly. Furthermore the problem of leaving out or duplicating teaching steps was all but eliminated. The old trial and error system became obsolete.

Charles Selvidge, who later became Industrial Education Program Director at the University of Missouri, followed through after the war by refining Allen's system and utilizing it in the development of industrial training programs for the military. Verne C. Fryklund is credited with further refining the system and introducing it into the public school industrial education program. He built on Allen's and Selvidge's systems and wrote a book in 1942 entitled Occupational Analysis Procedures and Techniques, which is still in print today after five revisions. The Fryklund system was developed

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for use by the military in World War II and was introduced into the schools in the late 1940's.

Fryklund was president of Stout Institute at Menomonie, Wisconsin following World War II and promoted his analysis concept among future industrial education teachers who were enrolled in degree programs. Basically his system was one of breaking an occupation down into blocks, jobs, doing lesson titles, knowing lesson titles, steps (or topics) and key points. The aforementioned breakdown is shown in Figure 1.

The basic concept of Fryklund's analysis system was to break down technical information and skills into elemental points which, when learned well, could be combined into larger units of work called jobs. If enough of these elemental topics were mastered, the student could combine them into the performance of jobs (or competencies) which are found in an occupation. Charts were made from the analysis which graphically depicted the relationship between these elements (called operations) and jobs. An example of a psychomotor analysis chart showing selected operations and jobs is shown in Figure 2. These analysis charts were completed concurrently with the breakdown shown in Figure 1.

Note that the basic operations found in the occupation were listed vertically, proceeding from the most frequently used to the least frequently used on the job. The jobs were then listed horizontally across the top of the chart. By checking off which operations were found in which jobs, it was possible to determine what should be taught as well as the order of teaching. Furthermore the system helped to eliminate skips and overlap in the flow of instruction.

Figure 1

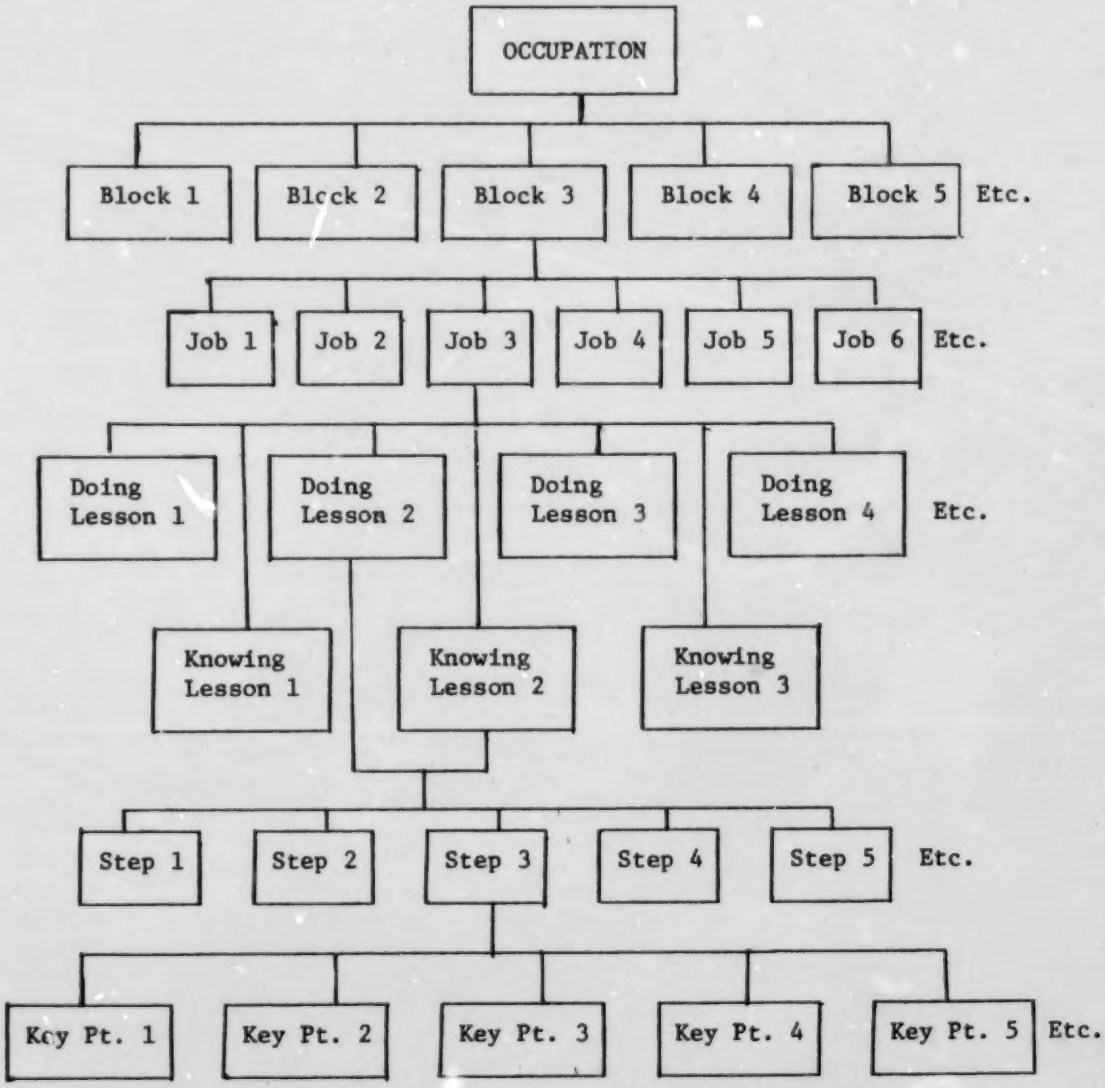

OCCUPATION
Block 1
Block 2
Block 3
Block 4
Block 5
Etc.
Job 1
Job 2
Job 3
Job 4
Job 5
Job 6
Etc.
Doing Lesson 1
Doing Lesson 2
Doing Lesson 3
Doing Lesson 4
Etc.
Knowing Lesson 1
Knowing Lesson 2
Knowing Lesson 3
Step 1
Step 2
Step 3
Step 4
Step 5
Etc.
Key Pt. 1
Key Pt. 2
Key Pt. 3
Key Pt. 4
Key Pt. 5
Etc.

Figure 2

AN INSTRUCTIONAL ANALYSIS OF CARPENTRY
(Fryklund Method)

Jobs (Completed Units of Work)

Operations (Teaching Lessons) How to:	Stake out Bldg.	Form Step Footer	Wall Forms	Column Forms	Step Forms	Curved Walk Forms	Erection of Sec. Forms	Assemble a Built-up Girder	Install T-Sill	Install L-Sill	Install Joists	Cut & Inst. Cross Bridging	Cut & Inst. Solid Bridging	Frame a Stairwell	Frame a Wall Section	Frame a Door Opening	Frame an Arch Opening	Layout & Cut Common Rafter	Layout & Cut Valley Rafter	Layout & Cut Hip Rafter	Layout & Cut Jack Rafter	Frame Chimney Opening	Frame Gable Dormer
1 Plan a Procedure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
2 Read a Drawing	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3 Make a Bill of Mater.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4 Check Del. Material	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
5 Make a Plan	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
6 Drive & Draw Nails	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6					6	6
7 Layout Square Cuts	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7		7			7	7
8 Test for Squareness	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8		8	8		8	6
9 Layout Patt. on Stock						9		9			9	9	9	9	9	9	9	9	9	9	9	9	9
10 Saw to a Line	10	10	10	10	10	10	10	10	10		10	10	10	10	10	10	10	10	10	10	10	10	10
11 Make a Butt Joint		11	11	11	11	11	11	11	11	11	11		11	11	11	11	11					11	11
12 Test for Level	12	12	12	12	12	12	12	12							12	12	12						12
13 Guide with Pencil		13	13	13	13	13	13																
14 Sight for Straightness	14	14	14	14	14	14	14	14	14	14	14			14	14	14	14	14	14	14	14	14	14
15 Snap a Chalk Line		15	15	15		15	15	15	15	15		15	15		15								15
16 Plane Edge Grain																							
17 Plane End Grain																							
18 Saw Curves						18																	
19 Layout & Cut Material					19	19																	
20 Smooth w/Sandpaper																							
21 Set a Nail																							
22 Toe Nail					22	22			22	22	22	22	22	22	22	22	22						
23 Trim & Pare w/Chisel																							
24 Install Scaffolding			24	24			24														24	24	24
25 Remove Scaffolding			25	25			25														25	25	25
26 Fasten with Screws																		27	27	27	27		27
27 Read Framing Square																							
28 Layout Joints											28												
29 Layout Studs			29												29								
30 Cut & Install Brdng.												30	30										
31 Install Termite Shield									31	31													
32 Build Corner Post															32								
33 Layout Floor Opening															33								
34 Build T-Post															34								
35 Install Batter Boards	35																						
36 Cut & Inst. Fire Stops											36				36								

Fryklund's analysis technique became a standard mode of breaking down content for the purpose of curriculum development. This was particularly evident in the Midwest where his approach had great influence on industrial education curricula. One must remember that during the post World War II era published analyses for use in the schools were not available. The few published curriculum guides which were available tended to be rather sketchy and more likely to be based on textbook material than an analysis of industry. Teachers were expected to know how to analyze their own occupations for course content and to develop their own personal curriculum guides based upon this analysis.

Today, of course, we have V-TECS catalogs, Ohio Analysis Guides, Colorado Occupational Analyses, and many others, encouraging the teacher to become dependent upon professional work already done. There are, in fact, many contemporary T & I and Industrial Arts programs where a course in occupational analysis is not even required. The process of analysis is now being done by the experts--and teachers are no longer required to develop skills in analysis.

The new systems of analysis are well done but also have become more complex, making it difficult for teachers to understand the true value of the process, or the ability to simplify it to fit the situation. The newer systems are more sophisticated. We are now dealing with terminal performance objectives, enabling objectives, criterion referenced measures and a wealth of other complexities which contribute to a greater abstractness and tend to minimize practicality in the classroom. There is certainly nothing wrong with the contemporary approach--it's just that sometimes we tend to hone something to such a fine point that the ordinary laboratory teacher with a minimal research and development background is "turned off" by it.

It appears to me that we need to start listening more to T & I laboratory

teachers and less to the research and development people. A basic system without all the embellishments as designed by Fryklund is certainly more likely to be utilized by the average occupational teacher than a more sophisticated system which is harder to comprehend. Furthermore the increasing complexity usually makes a system more time consuming and results in a greater proliferation of paper work. When this happens, it only follows that there is less time left for teaching and class supervision. Coupling individualized instruction with the newer analysis system has added to the complexity.

A case in point is the use of rating scales as criteria referenced measures for psychomotor competencies. (Figure 3). This is a popular concept in a true CBVE program. A good rating scale used to measure a single task can include as many as 15 to 20 factors. With the exception of drafting and brickmasonry, where the same evaluation factors are utilized for most competencies, a T & I teacher would need to develop as many rating scales as there are tasks. It is not uncommon to have 200 or more tasks in a two year curriculum. With an average of 15 students in a class, it is conceivable that teachers would need to utilize 3,000 rating sheets during the entire course. This, of course becomes an impossibility and teachers either rebel or pretend to be using the contemporary system, when in actuality they are using a less complex method with which they feel comfortable.

Let's examine the performance objective, a fundamental part CBVE. Note that there are three parts to the performance objective: (1) conditions, (2) performance and (3) standard. In T & I we make wide use of job sheets. The first two parts of the performance objective are found on the job sheet for a particular task. The standard for most T & I tasks is far too complex to list as part of the objective. Note in the following performance objective

Figure 3

INSTRUCTOR RATING SCALE*

TASK: LAYOUT, CUT AND INSTALL COMMON RAFTERS FOR EQUAL PITCHED ROOFS

ACTIVITY	RATING	
	A	U
1. Checked prints and details		
2. Determined building span		
3. Calculated rafter length		
4. Determined plumb and plate cuts		
5. Selected marking pattern		
6. Laid out tom plumb cut		
7. Established layout line		
8. Laid out birds mouth cut		
9. Laid out taic for cornice		
10. Checked calculations and layout		
11. Cut rafter pattern		
12. Marked required rafters		
13. Cut out rafters		
14. Layout ridge and wall plate		
15. Erect rafters in pairs		
16. Plumbed gable rafters		
17. Checked alignment and nailing		

*Vocational Education Consortium of States, Carpenter V-TECS Catalog, p. 400-401.

what we would actually be required to write if the standard were written accurately.

Given a hot water heating system and plumbing tools and supplies, install a water circulating pump in the system. Completed work must conform to the following:

A. Pump is in position specified by manufacturer.
B. Pump operates properly when activated.
C. Pipe joints do not leak when pump is activated.
D. Finished work is neat in appearance.
E. Trainee left work area clean.
F. Work was performed within established time limit.

Inasmuch as it is impractical from a time standpoint to include all of the things upon which to evaluate each psychomotor task, the performance objective will very often indicate gross or superficial standard's such as (a) to please the patron, or (b) so engine runs smoothly. Such shortcuts, of course, defeat the whole idea of utilizing a measurable standard.

There are many other factors which have entered into the modern concept of analysis, however time does not permit a discussion of all of them. However a careful in-depth study of the new CBVE approach for curriculum development versus the traditional T & I occupational analysis would offer these conclusions:

1. No matter how good something is, constant increase in its complexity will eventually lead to a decline in usefulness.

2. Teachers are "turned off" when the system becomes so time consuming that it gets in the way of providing good instruction.

3. It is sometimes possible to "improve" on something until it reaches a point of diminishing returns,--These returns being the achievement of boys and girls.

4. T & I teachers have had a simple, yet truly superior analysis system for over forty years. We originally pioneered the analysis concept.

5. Let's not be influenced by what other disciplines think are right for them. Decisions for our program should be made by classroom seasoned T & I teachers with the cooperation of industry advisory committees.

6. There must be a careful balance between level of sophistication and level of practicability. Too much of one or the other will tend to decrease teacher productivity.

7. Our heritage in occupational analysis should not be lost. T & I people need to have more influence on contemporary curriculum development.

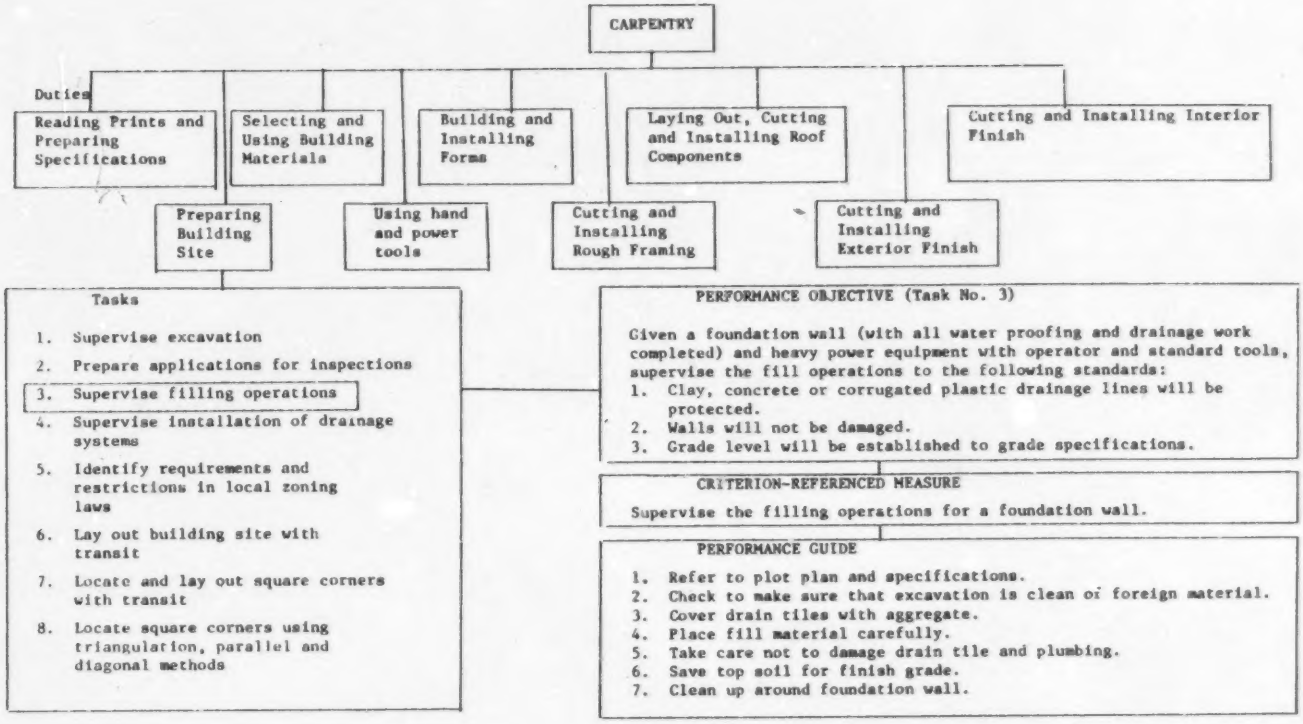
APPENDICES

Appendix A The Fryklund System of Occupational Analysis

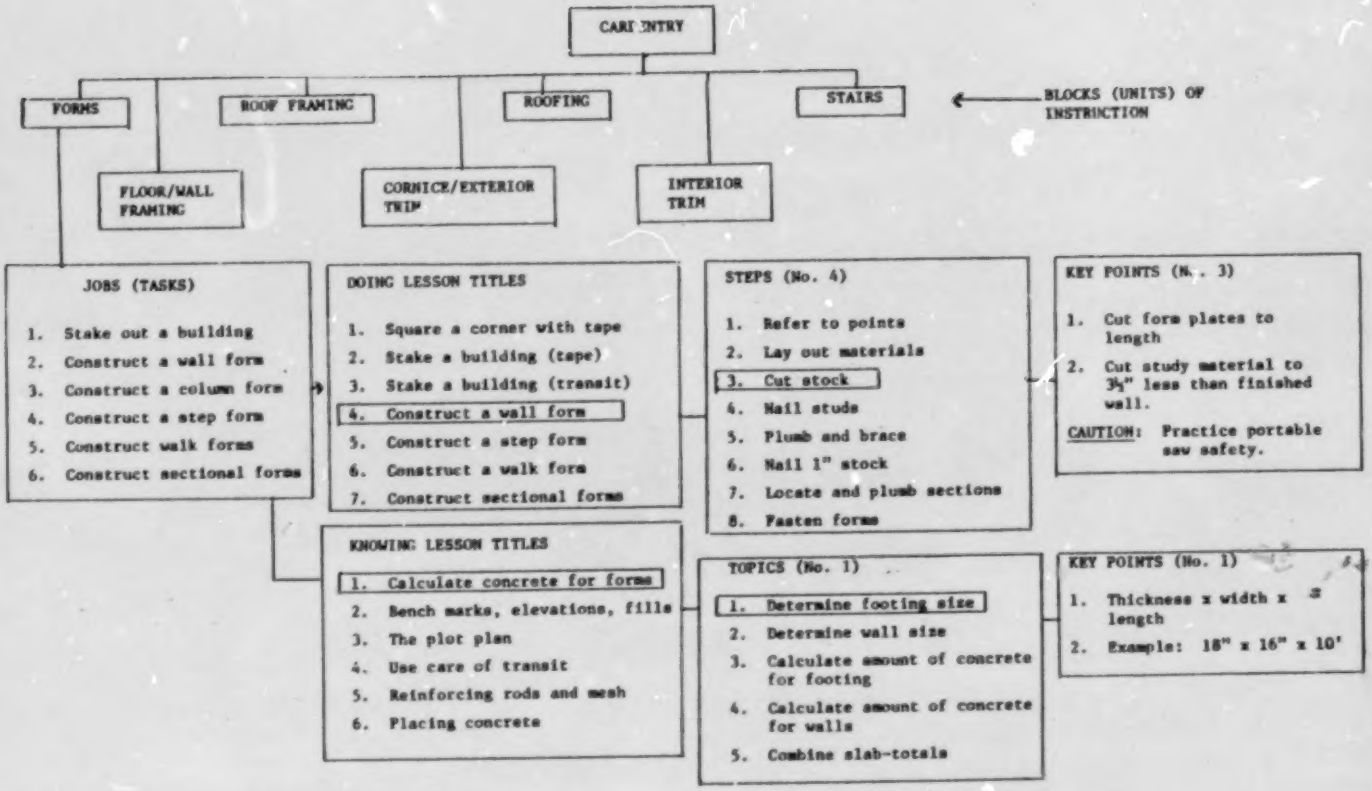
Appendix B A Contemporary System of Occupational Analysis (V-TECS)

Appendix C A Comparison of Traditional and Contemporary Systems of Analysis

Appendix D Pros and Cons of Traditional and Contemporary Systems of Analysis



APPENDIX B A CONTEMPORARY SYSTEM OF OCCUPATIONAL ANALYSIS (V-TECS)



APPENDIX A THE FRYKLUND SYSTEM OF OCCUPATIONAL ANALYSIS

A COMPARISON OF TRADITIONAL AND
CONTEMPORARY SYSTEMS OF ANALYSIS

Component	Traditional Fryklund Analysis	Contemporary V-TECS Analysis
1. Units	Units are referred to as "blocks".	Does not follow a unit approach.
2. Duty	Not utilized. Similar duties are combined into blocks.	All analyses are broken down into the major duties performed on the job.
3. Task	Called "jobs". Jobs are defined as "completed units of work." Jobs are psychomotor in nature.	Duties in an occupation are broken down into tasks. Tasks may be cognitive, affective or psychomotor.
4. Performance objective	Not utilized. All components of the performance objective are indicated on the job sheet, which is given to the student. The standard, however, is often weak.	A performance objective exists for each task which indicates (1) conditions, (2) performance and (3) standard.
5. Criterion-referenced measure	Not utilized as such. The job sheet actually serves as a criterion-referenced measure.	A criterion-referenced measure is found for each performance objective.
6. Operation	The operation is a "doing lesson". Several operations, when mastered, will make up a job (completed unit of work).	Not utilized (as such). Some tasks are operations, others are really jobs.
7. Performance guide	The "performance guide" can be equated to "steps" in the Fryklund plan.	Tasks are broken down into steps which are called "performance guides".

A COMPARISON OF TRADITIONAL AND
CONTEMPORARY SYSTEMS OF ANALYSIS (CONT.)

Component	Traditional Fryklund Analysis	Contemporary V-TECS Analysis
8. Doing lesson	Each block is broken down into the doing lesson titles which must be taught before the student can do the jobs listed.	Not utilized.
9. Knowing lesson	Each block is broken down into the knowing lesson titles which must be taught so that students have the necessary knowledge to do the job. Knowing lessons are further broken down into technical, general and guidance.	Not utilized.
10. Steps	Doing lessons are broken down into teaching steps.	The task is broken down into a performance guide (same as steps).
11. Topics	Knowing lessons are broken down into major topics.	Not utilized.
12. Key Points	Doing lesson steps and knowing lesson topics are broken down further into key points.	Not utilized. (The performance guide (steps) is the end of the breakdown).

PROS AND CONS OF TRADITIONAL AND
CONTEMPORARY SYSTEMS OF ANALYSIS

Criterion	Traditional Fryklund Analysis	Contemporary V-TECS Analysis
1. Type of content	A breakdown meant for use in a training situation. "Jobs" are designed for teaching purposes.	A breakdown of tasks done by the worker in industry. May or may not be "teaching jobs". Many tasks are too broad to use as instructional units.
2. Evaluation	Establishing a standard for each job is not part of the system, This is, however, done by the instructor when utilizing the job sheet. This is a weakness in the traditional system.	Standards are set in the performance objective. Most tasks, however will require the use of a more comprehensive rating scale, if real achievement is to be measured.
3. Use as a recording system	A record of jobs completed is maintained in the same way as contemporary systems.	An individual vocational education plan is maintained for each student.
4. Use of the system with varying ability levels	An individualized plan is made for each student, based upon the analysis. Larger jobs may be broken down into simpler operations.	Same as traditional.
5. Keeping up-to-date	This is left to the individual teachers. A new analysis should be done every 3 to 5 years. This is a weakness in the traditional system.	V-TECS catalogs are based on input from the incumbent worker.

PROS AND CONS OF TRADITIONAL AND
CONTEMPORARY SYSTEMS OF ANALYSIS (CONT.)

Criterion	Traditional Fryklund Analysis	Contemporary V-TECS Analysis
6. Utilization in the classroom and laboratory	After the analysis is complete, paper work involves only a record of jobs completed.	Utilization of a rating scale for each separate task takes away from total teaching time.
7. Staff development	Teachers who perform their own analysis learn a great deal about their occupational area and ways of presenting it.	Utilization of an analysis made by others may or may not fit a particular teaching situation. Furthermore teachers are not given the opportunity to grow in organizational techniques.

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(NOTEBOOK COVER)

Analysis of

Name of Subject

by

Your Name

An Analysis of

(name of occupation)

(Name)_____Vocational Technical School

_____(location)_____

Your Name

Date

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Operation and Information Sheets (Block 4) (Continue for all blocks.	_____
Job Sheets	_____
Analysis Chart of Occupation	_____

INTRODUCTION

TITLE

NATURE OF COURSE:

LENGTH OF COURSE:

COURSE LEVEL:

PRIOR TRAINING OR PREREQUISITE NEEDED:

AGE RANGE OF STUDENTS:

PURPOSE AND SCOPE OF COURSE:

EQUIPMENT AVAILABLE:

OBJECTIVES FOR A COURSE IN

_____

The over all purpose for this course in _____
will be met if the student will realize the following objectives:

(List here from 5 to 15 goals of your course, stated in terms of student development).

CLARIFICATION OF OBJECTIVES

1. Objective No. 1, restated)

   The student, as result of accomplishing this objective,

   <u>will understand</u>
   A. (List here the cognitive outcomes)
   B. (etc.)
   C. (etc.)

   <u>will be able to</u>
   A. (List here the psychomotor outcomes)
   B. (etc.)
   C. (etc.)

   <u>will</u>

   A. (List here the affective outcomes)
   B. (etc.)
   C. (etc.)

2. Objective No. 2, restated)

   The student as a result of accomplishing this objective,

   <u>will understand</u>

   A. (List here the cognitive outcomes)
   B. (etc.)
   C. (etc.)

   <u>will be able to</u>
   A. (List here the psychomotor outcomes)
   B. (etc.)
   C. (etc.)

   <u>will</u>
   A. (List here the affective outcomes)
   B. (etc.)
   C. (etc.)

(Continue for all objectives listed on previous page)

BLOCK BREAKDOWN

	Block Titles	1st Year	2nd Year
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			

ROTATION SCHEDULE

1 - 9 wks.	10 - 19 wks.	19 - 27 wks.	28 - 36 wks.
Name of Block Group __	Name of Block Group __	Name of Block Group __	Name of Block Group __
Name of Block Group __	Name of Block Group __	Name of Block Group __	Name of Block Group __
Name of Block Group __	Name of Block Group __	Name of Block Group __	Name of Block Group __
Name of Block Group __	Name of Block Group __	Name of Block Group __	Name of Block Group __

Format for a rotation schedule using four blocks
(Use this system only if applicable for your subject)

SELECTION OF JOBS OR ACTIVITIES
FOR EACH UNIT

Jobs or Activities

Unit No._____ Title_____

1st Year	2nd Year
1_____	1_____
2_____	2_____
3_____	3_____
4_____	4_____
5_____	5_____
6_____	6_____
7_____	7_____
8_____	8_____
9_____	9_____
10_____	10_____
11_____	11_____

Unit No._____ Title_____

1st Year	2nd Year
1_____	1_____
2_____	2_____
3_____	3_____
4_____	4_____
5_____	5_____
6_____	6_____
7_____	7_____
8_____	8_____
9_____	9_____
10_____	10_____
11_____	11_____

LESSON TITLE BREAKDOWN

BLOCK NO._____ TITLE_____

No.	Doing Lessons	Ref. Code	No.	Knowing Lessons	Ref. Code
				Technical Topics	
				General Topics	
				Guidance Topics	

REFERENCES

Author	Title	Publisher	Code

OPERATION AND INFORMATION SHEETS

Block No. 1

The following section will include operation sheets and information sheets for each topic listed in the breakdown for this unit. Include technical, general and guidance types of information sheets

OPERATION SHEET

No._____

Title of Demonstration Lesson

References

Equipment, tools, materials

Steps	Key points (Things to remember to do or say)

INFORMATION SHEET

(Technical Topic) No._____

Title of Information Lesson

References

Teaching aids, materials

Instructional Topics	Key points (things to remember to do or say)

INFORMATION SHEET

(General Topic) No._____

Title of Information Lesson

References

Teaching aids, materials

Instructional topics	Key points (things to remember to do or say)

INFORMATION SHEET
(Guidance Topic)

No. _____

Title of Information Lesson

References

Teaching aids, materials

Instructional Topics	Key Points (things to remember to do or say)

OPERATION AND INFORMATION SHEETS

(continue through all blocks in your course)

JOB SHEETS

(For the Teacher)

Include here one job sheet for each job listed in your block breakdowns

Analysis of

_____

Based on Instructional Units / Operations How to	Typical Jobs																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25